

Serial No. 10/730,537
Examiner: Jessie Randall Roc

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CLAIMS

1. (Previously Presented) A method for preparing an anodized electrode comprising the sequential steps of:

- (1) providing a substrate;
- (2) coating the surface of the substrate by vacuum deposition thereon of a porous coating comprising at least one substance selected from valve metals, valve metal oxides and mixtures thereof;
- (3) increasing the effective surface area of said porous coating; and
- (4) producing electrolytically at least one anodized valve oxide layer overlaying the surface of said porous coating;

and wherein said effective surface area increase of said porous coating is implemented by at least one of the following:

increasing the total pore volume of said porous coating;

increasing the average pore width in said porous coating.

2. (Canceled)

3. (Previously Presented) A method according to claim 1, which is further characterized by at least one of the following features:

- (a) said substrate is an electrically conductive substrate;
- (b) said porous coating comprises at least one member selected from aluminum, aluminum oxide and mixtures thereof;
- (c) said at least one electrolytically produced layer comprises aluminum oxide;
- (d) said effective surface area increase has been implemented by at least one procedure selected from:

electrochemical etching, and

oxidizing the surface of said porous coating followed by removal of thus formed oxide;

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- (e) prior to deposition of said porous coating, the surface of said substrate has been subjected to a roughening procedure selected from mechanical, chemical and electrochemical procedures;
- (f) said vacuum deposition is carried out in an inert gas atmosphere at a pressure about 10^{-3} Torr, and about 10^{-2} Torr,
- (g) said vacuum deposition is carried out in an inert gas atmosphere in presence of a minor amount of oxygen;
- (h) following step (4), the product is thoroughly rinsed with a liquid selected from distilled and de-ionized water, and then dried.

4. (Original) A method according to claim 3, which is further characterized by at least one of the following features:

- (A) said electrically conductive substrate is a metallic foil substrate;
- (B) step (3) is implemented by electrolytic anodization and simultaneously or subsequently removing electrolytically formed valve metal oxide.

5. (Previously Presented) A method according to claim 4, wherein step (4) is carried out by forming a series of at least two anodized layers, provided that the product of said forming is subjected to annealing prior to forming the last anodized layer in said series.

6. (Previously Presented) A method according to claim 5, wherein the product of said forming is thoroughly rinsed with a liquid selected from distilled and de-ionized water, prior to said annealing.

7. (Previously Presented) A method according to claim 4, wherein said substrate is a metallic foil substrate; in step (2) said at least one valve metal comprises aluminum; in step (3) said increasing is implemented by oxidizing the surface of said vacuum deposited porous coating by anodization in presence of an electrolyte which comprises a saturated dicarboxylic acid salt selected from the ammonium and alkali metal salts, and removing thus-formed valve metal

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oxide(s) by use of a halogen-free chemical etchant *in situ* or in a discrete subsequent sub-step; and in step (4) said at least one layer comprises aluminum oxide.

8. (Previously Presented) A method according to claim 7, wherein step (4) is carried out by forming a series of at least two anodized layers, provided that the product of said forming is subjected to annealing prior to forming the last anodized layer in said series.

9. (Original) A method according to claim 7, wherein at least one of the following features applies:

said vacuum deposition is carried out in an inert gas atmosphere at a pressure about 10^{-3} Torr. and about 10^{-2} Torr. in presence of a minor amount of oxygen;
said electrolyte comprises a salt selected from the ammonium and alkali metal adipates;
said chemical etchant is selected from chromic, oxalic and phosphoric acid, and mixtures thereof.

10. (Original) A method according to claim 8, at least one of the following features applies:
said vacuum deposition is carried out in an inert gas atmosphere at a pressure about 10^{-3} Torr. and about 10^{-2} Torr. in presence of a minor amount of oxygen;
said electrolyte comprises a salt selected from the ammonium and alkali metal adipates;
said chemical etchant is selected from chromic, oxalic and phosphoric acid, and mixtures thereof.

11. (Previously Presented) A method according to claim 4, wherein said substrate is a metallic foil substrate; in step (2) said at least one valve metal consists essentially of aluminum and said vapor deposition of claim 3, clause (g) is carried out such that said porous coating consists essentially of aluminum metal and aluminum oxide; in step (3) said increasing is implemented by oxidizing the surface of said porous coating by anodization in presence of an electrolyte which comprises a saturated dicarboxylic acid salt selected from the ammonium and alkali metal salts thereof, and removing thus-formed valve metal oxide(s) by use of a halogen-free chemical etchant *in situ* or in a discrete subsequent sub-step; and in step (4) said at least one layer comprises aluminum oxide.

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12. (Previously Presented) A method according to claim 11, wherein step (4) is carried out by forming a series of at least two anodized layers, provided that the product of said forming is subjected to annealing prior to forming the last anodized layer in said series.

13. (Previously Presented) A method according to claim 11, wherein at least one of the following features applies:

said vacuum deposition is carried out in an inert gas atmosphere at a pressure about 10^{-3} Torr. and about 10^{-2} Torr.;

said vacuum deposition conditions are such that said porous coating prior to step (3) consists essentially of at least 40% aluminum metal, balance aluminum oxide;

said electrolyte comprises a salt selected from the ammonium and alkali metal adipates;

said chemical etchant is selected from chromic, oxalic and phosphoric acid, and mixtures thereof.

14. (Previously Presented) A method according to claim 11, wherein at least one of the following features applies:

said vacuum deposition is carried out in an inert gas atmosphere at a pressure about 10^{-3} Torr. and about 10^{-2} Torr.;

said vacuum deposition conditions are such that said porous coating prior to step (3) consists essentially of 50-85% aluminum metal, balance aluminum oxide;

said electrolyte comprises a salt selected from the ammonium and alkali metal adipates;

said chemical etchant is selected from chromic, oxalic and phosphoric acid, and mixtures thereof.

15-24. (Cancelled)